

Are antimalarial activities performed properly by frontline health workers? A cross-sectional study in Bankura

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ABSTRACT

Background: Under NVBDCP, health workers at subcentre level are primarily responsible for diagnosis of malaria through blood smear or RDT and managing accordingly. **Objective:** To assess the knowledge regarding diagnosis, treatment and control of malaria as per national programme and the skill on diagnosis and management of malaria in addition to logistic support and performance on diagnosis, management & reporting of malaria in last 12 months. **Materials and Methods:** A descriptive cross-sectional study was conducted in Bankura district of West Bengal. Two blocks were selected through stratified random sampling based on Annual Parasite Incidence (API). In each block, 3 Gram Panchayats (GP) were selected through stratified random sampling based on distance from Block Headquarters. All Health workers working at all sub-centres within selected GPs were included in the study. Mean score of knowledge and skill was computed. Data were analysed using SPSS version 22.0. **Results:** 68.7% of them were untrained in Malaria in Gangajalghati block. More than 70% of health workers knew the correct interpretation of Rapid diagnostic test in both blocks. Correct knowledge on complete treatment of *P. vivax* was better than of *P. falciparum* in all groups of health workers. Knowledge on contraindication of antimalarial drugs was not good among them. Skill on preparing blood smear, performing RDK and case management was average with wide variation among several types of health workers. **Conclusion:** Knowledge on malaria diagnosis and control among health workers were average while on treatment was less than average with wide variations among several types of health workers. Higher educational qualification, lesser service experience and training in malaria revealed better knowledge among health workers.

Key-words: Malaria, rapid diagnostic test, Annual Parasite Incidence (API), skill, blood smear.

INTRODUCTION

Malaria caused by Plasmodium species continues to be a major public health problem in India with high mortality in complicated malaria in Plasmodium falciparum (Pf) infestation.¹ About 27% population of the country lives in areas with high malaria transmission with Annual Parasite Incidence (API) 1 or more whereas another 58% lives in areas with low malaria transmission (API < 1).¹ 15 states of India including north eastern states and West Bengal reported around 92% of all malaria cases and 97% of deaths due to malaria.² In 2012, the Annual Blood slide Examination Rate (ABER), API, Slide positivity rate (SPR) and Pf proportion (Pf%) were 9.0%, 0.88%, 0.98% and 50% respectively. The corresponding figures for West Bengal were 5.4%, 0.6%, 1.1% and 15.5% respectively.³ The corresponding figures for Bankura district were 10.18%, 0.45%, 0.44% and 22.95% respectively.⁴ The forest and forest fringe areas of Terai, Dooars in northern districts and Junglemahal areas of south western districts along with Kolkata and adjoining areas are known for high transmission of malaria.⁵

It is estimated that practical and accurate diagnostic tests for malaria diagnosis have the potential to avert 400 million unnecessary treatments and save 100,000 lives annually.⁶ Resistance of Plasmodium falciparum to Chloroquin has been widespread in India and in response; Artemisinin-based Combination Therapy (ACT) is recommended as the first line treatment for all cases in India.⁷

Under national Vector Borne Disease Control Programme (NVBDCP), one of the major thrust areas for malaria control is early diagnosis and prompt, complete, effective treatment. For strengthening diagnostic activities, Rapid Diagnostic test (RDT) with bivalent (both Pf and Pv) or monovalent (Pf only) kit has been introduced in high endemic areas.⁸⁻⁹

Under NVBDCP, health workers at sub-centre level are primarily responsible for diagnosis of malaria through blood smear or RDT and managing accordingly.^{8, 10} It was noted worldwide that in providing good quality care

for malaria, the stumbling blocks are increasing complexities in diagnosis and treatment of malaria as well as lack of appropriate skills in peripheral health workers.¹¹⁻¹³ However, there is paucity of data regarding knowledge, skills and practices of frontline health personnel in India in published literature¹⁴. On the basis of this background the study was conducted in Bankura district of West Bengal (India) at Sub-centre level to assess the knowledge of frontline health workers regarding diagnosis, treatment and control of malaria as per national programme (NVBDCP), to assess the skill of study participants on diagnosis and management of malaria and to assess the logistic support and performance of health workers regarding antimalarial activities in last 12 months.

MATERIAL AND METHODS

An observational, cross-sectional, descriptive study was undertaken among frontline health workers at subcentre level in Bankura district. Bankura, a south-western district in West Bengal with 3.5 million population covering 6882 sq. Km. Area over 22 community development blocks.¹⁵ Primary health care in the district is provided through 22 Block level Primary health centre/ Rural hospitals, 70 Primary Health centres and 564 subcentres. Nine blocks of the district are malaria endemic with a long standing focus of Chloroquin resistance.^{16, 17} Total duration of the study was of 8 months from May to December 2014. Based on the state average of Annual Parasite Incidence (API), 2 blocks in Bankura districts of West Bengal was selected: one with API ≥ 1 and another with API < 1. Ranibandh block with API =4.52 and Gangajalghati block with API =0.05. In each of the selected block, GPs was divided into 3 strata based on distance from block head quarter using tertile values. From each stratum 1 GP was selected by simple random sampling. All the sub-centres under those 3 GPs were covered in this study. Total 35 health workers were included in this study. Health workers working under selected sub-centres were taken as study subject. Semi-structured questionnaire was used to collect baseline information and knowledge on diagnosis, treatment and control of malaria as per national programme of the health care providers. Clinical case vignettes were used as simulation for assessing the skill of the providers in malaria case management. A checklist was used for observation during preparation of blood smear and performing RDT. Review of records was done for assessing their performance regarding diagnosis, management and reporting of malaria cases in last 12 months.

Data management and analysis:

After getting ethical permission from Institutional Ethical committee of Bankura Sammilani Medical College, Bankura, West Bengal. Data collection tools was developed and tested among health workers in a nearby block. Data were collected by the investigator through visit to the selected sub-centres of both the blocks. Mean

(± SD) of score and proportion of specific attributes in the domain of knowledge, skills and practices was calculated and expressed in suitable tables and diagrams. Parametric and Bivariate non-parametric test was applied to assess the relation of socio-demographic, individual and health service related variables of HWs and their knowledge, skills and practice. For scoring of skills for preparation of blood slides, performance of RDK and case management and knowledge score of the health workers raw data were used.

RESULTS

In both the block 35 health workers were taken as study sample among which fifteen were 1st ANM, fifteen were 2nd ANM and five of them were HW(M). Proportion of health workers was 60.0% of 1st ANM, 40.0% of 2nd ANM and 20.0% of HW(M) in Gangajalghati block whereas in Ranibandh block it was 40.0%, 60.0% and 80.0% respectively.

Majority of health workers’ qualification was higher secondary (56.3%) at the time of joining the service in Gangajalghati whereas higher secondary (42.1%) and graduate (42.1%) in Ranibandh block. 37.5% of health workers in Gangajalghati and 47.4% in Ranibandh block had service experience of 2-5 years. Almost one-third of health workers had 10 years or more service experience in Gangajalghati while no participants had experience beyond 10 years in Ranibandh block. Only one-third of health workers were trained in Malaria in Gangajalghati (31.3%) whereas all of the health workers in Ranibandh were trained in Malaria.

Table No.1: Distribution of health workers according to designation and the knowledge on diagnosis, treatment and contraindication of drug of malaria (n=35)

Knowledge on	1 st ANM	2 nd ANM	HW(M)	χ ²	P value
	No. (%)	No. (%)	No. (%)	Linear trend	
Volume of blood required for both thick and thin smear	5(33.3)	8(53.3)	4(80.0)	2.24	0.37
Interpretation of RDK	14(93.3)	8(53.3)	4(80.0)	1.96	0.16
Correct treatment of Plasmodium vivax	8(53.3)	7(46.6)	3(60.0)	0.005	0.94
Correct treatment of Plasmodium falciparum	3(20.0)	1(6.6)	2(40.0)	0.204	0.65
Contraindication of Chloroquine	5(33.3)	2(13.3)	2(40.0)	0.054	0.81
Contraindications of ACT	9(60.0)	5(33.3)	3(60.0)	0.296	0.58
Contraindications of Primaquine	5(33.3)	3(20.0)	1(20.0)	0.605	0.43

Majority of HW(M) (80.0%) had knowledge on correct amount of blood for both thick and thin smear. Correct knowledge on interpretation of RDK was highest among 1st ANM (93.3%) followed by HW(M) (80%) then 2nd ANM(53.3%). Correct knowledge on treatment of Plasmodium vivax was better than Plasmodium falciparum in all the groups of health workers. Correct knowledge on contraindication of Chloroquine, ACT and Primaquine drugs was not good among the health workers. The differences were not statistically significant on knowledge on diagnosis, treatment and contraindications of treatment among health workers (p>0.05). Nearly half of health workers were aware of all the three indications for referral of complicated malaria cases and the difference was statistically not significant (p >0.05). 6.7% of 2nd ANM could not spell out any of the preventive measure.(Table 1)

Table no 2: Knowledge of workers on few aspects of malaria (n=35)

Knowledge on	1 st ANM	2 nd ANM	HW(M)	Total
	No. (%)	No. (%)	No. (%)	No. (%)
Indications for referral	7(46.7)	7(46.7)	2(40.0)	16(45.7)
Preventive measures	15(100.0)	13(86.6)	5(100.0)	33(94.3)
Duration of effectiveness of one round DDT spray	7(46.7)	9(60.0)	3(60.0)	19(54.3)
Duration of effectiveness of LLIN	5(33.3)	3(20.0)	3(60.0)	11(31.4)
Population catered under their Sub-centre	14(93.3)	15(100.0)	5(100.0)	34(97.1)
Target blood slide/annum	6(40.0)	9(60.0)	4(80.0)	19(54.3)
Name of reporting forms	14(93.3)	13(86.7)	5(100.0)	32(91.4)
Time for submission	12(80.0)	8(53.3)	3(60.0)	23(65.7)
Place for submission	14(93.3)	11(73.3)	4(80.0)	29(82.9)

Correct knowledge regarding duration of effectiveness of one round of DDT spraying among health workers was 54.3% and for LLIN 31.4% irrespective of their designation. The difference in DDT spray and also in LLIN was statistically not significant (p>0.05). 97.1% of health workers were aware of the population catered under their respective sub-centre (SC). 54.3% of the participants knew their target for annual blood slide collection under their catering population. 91.4% of health workers were aware of the correct forms for submission of monthly report of malaria. Majority of 1st ANM (80.0%) knew when it is to be submitted. 82.9% of health workers knew the place of submission for reporting form. The difference on knowledge of reporting formats and procedures was not statistically significant (p >0.05).(Table 2)

Figure 1: Box and whisker plot showing distribution of knowledge score of health workers, skill of preparing Blood Smear, skill on performance of Rapid Diagnostic Test among health workers according to the designation, malaria training status and educational status of health workers

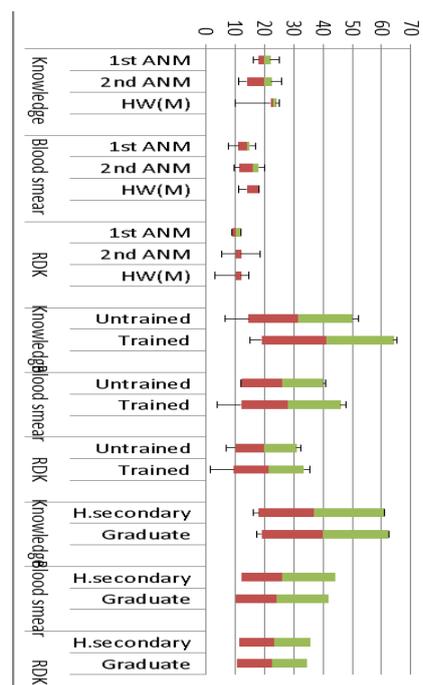
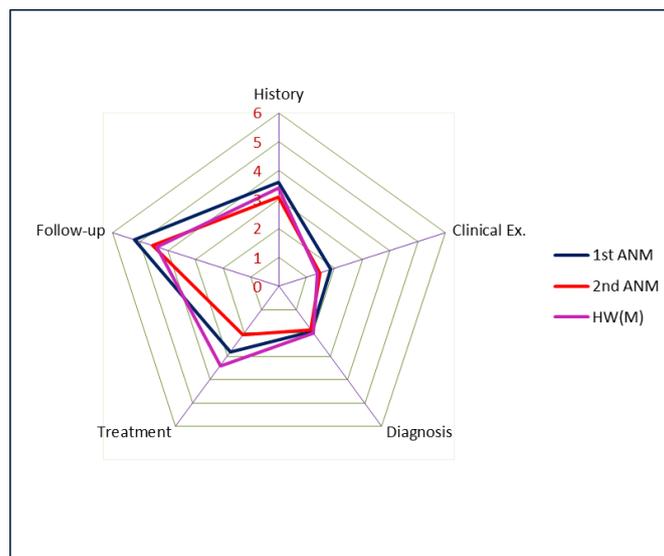


Figure No. 2: Radar chart showing skill of case management among different health workers.

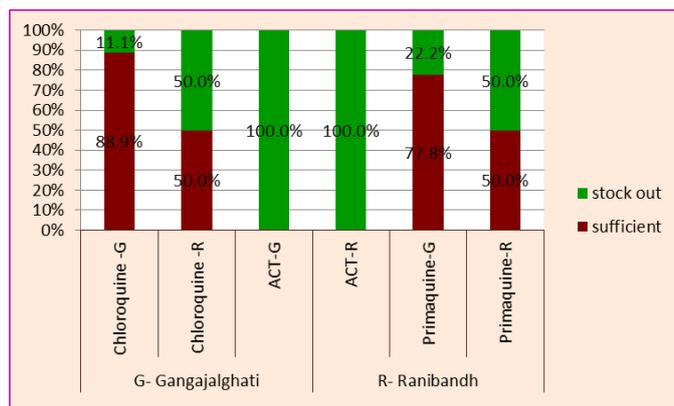


Median knowledge score of health workers with duration of service less than 5 years (21.5) was more than that of health workers with service duration of equal to or more than 5 years (18) regarding diagnosis, treatment and control of malaria as per national programme. Wide variation was seen in health workers with more than 5 years of duration of service above median and below median in less than 5 years of duration of service.

Median knowledge score of 1st ANM and 2nd ANM were equal (20) whereas HW (M) had better score (23) on knowledge regarding diagnosis, treatment and control of malaras per national programme. Wide variation below median was seen among 2nd ANM in knowledge score.

Median knowledge score of trained (22) health workers was better than untrained (17) and no variation was seen on health workers training status. Median skill score for preparation of blood smear was much better in HW(M) (18) followed by 2nd ANM (16) then 1st ANM (14). Wide variation above and below median score was seen in 2nd ANM. Wide variation was seen below median in 1st ANM and HW(M). Median skill score for preparation of blood smear was better among health workers trained (16) in malaria than untrained workers (14). Wide variation was seen more, below median in trained health workers. Median skill score of health workers in performance of Rapid Diagnostic Test was equal in 2nd ANM and HW(M) (12) whereas less in 1st ANM (10). The skill score of 2nd ANM and HW(M) varied more below median while varied more in above median among 1st ANMs. Median skill score in performance of Rapid Diagnostic Kit was more in trained (12) than untrained (10) health workers. The skill score was varied above median among untrained health workers and below median among trained health workers. Median knowledge score among graduate and above (20.5) was higher than below graduate (19) health workers regarding diagnosis, treatment and control of malarials per national programme. Wide variation was seen above median among the below graduates.

Figure No.3: Bar diagram showing Block wise distribution of Antimalarial drugs (n=19)



for history taking, clinical examination and follow up were better in 1st ANM than other worker. Skill of all health workers was similar in case of diagnosis. Skill of HW(M) was better in treatment of malaria followed by 1st ANM then 2nd ANM. Skill of 2nd ANM was less than 1st ANM and HW(M) in history taking, diagnosis and treatment of malaria.

Stock out of chloroquine was 11.1% in sub-centres of Gangajalghati and 50.0% in sub-centres of Ranibandh block and of primaquine was 22.2% and 50.0% in sub-centres of respective blocks. Stock out was 100.0% in both the block for ACT drug. 33.3% of stock out of blood slide and 22.2% of lancet was seen in some Sub-centres of Gangajalghati whereas 20.0% of RDK stock out was present in some Sub-centres of Ranibandh. Insufficient supply of blood slide, lancet and RDK was present in some Sub-centres of both the blocks.

Supply of M1 and M4 forms was sufficient in 100.0% subcentres of both the block. Stock-out of M2 forms was similar in subcentres of both the blocks (11.1% & 10.0%) and of M1 forms was 10.0% in subcentres of Ranibandh block. Number of fever cases treated was more in Gangajalghati than that of Ranibandh block. Performance of Rapid diagnostic test, blood slides drawn and frequency of sending blood slides for examination of diagnosis of malaria per month were better in Ranibandh than Gangajalghati block. The difference was statistically not significant (p >0.05).

DISCUSSION

Knowledge on interpretation of RDK was nearly 75.0%. Hawkes et. al in their study showed that 100% of participants correctly interpreted the RDT result. Correct knowledge on complete treatment of Pv and Pf was found in 51.43% & 17.14%, respectively. Correct knowledge on contraindication of Chloroquine, ACT and Primaquine was revealed in 31.6%, 57.9% and 26.3% of workers respectively. Reethaet. al reported in her study 12.1-30.9% respondents had knowledge about blister pack Chloroquine + primaquine. In a multi-centric study knowledge of healthcare providers regarding the correct effectiveness of LLIN was more than the present study. In another study in Pakistan, higher levels of education have been associated with improved knowledge about the appropriate strategies for the prevention and treatment of malaria. Mbachu et. al reported in Nigeria that over 80% of health workers was able to correctly identify the malaria M & E forms which corroborates with the present study. In a similar study conducted in Pakistan revealed education intervention was successful in increasing knowledge and changing behaviour. Knowledge, perception and practice gap was found among lower cadres of health workers with perception and practice being higher than knowledge in Nigeria. In a study in Congo, median (range) scores for RDT skills assessment were 100% (94% to 100%) whereas it was less in present study. Higher education and training in malaria revealed better knowledge among health workers with lesser work experience. But knowledge of malaria M & E (monitoring and evaluation) was found to significantly increase with increasing age and this was attributed to the positive effect of work experience on knowledge. Schmidt et al in their study showed that job experience had a substantial direct impact on job knowledge and a smaller impact on performance capabilities.

Conclusion:

More than two-thirds of health workers were not trained in malaria in Gangajalghati block. Higher studies and training in malaria revealed better knowledge among

health workers with lesser work experience. Knowledge on malaria diagnosis and control of malaria among health workers of study area as per national programme was average with wide variation among several types of health workers. Knowledge on malaria treatment as per national programme among health workers of study area were less than average with wide variations among several types of health workers. Logistic support was not sufficient with irregular supply, especially of ACT drug in all sub-centre of both the study areas. Skill on preparation of blood smear, performance of RDK and case management were average with wide variations among several types of health workers.

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